

# MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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## INTRODUCTION.

The MONTHLY WEATHER REVIEW for December, 1901, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: regular stations of the Weather Bureau, 159; West Indian service stations, 13; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Railway Company, 96; Hawaiian Government Survey, 200; Canadian Meteorological Service, 32; Jamaica Weather Office, 160; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3; Costa Rican Service, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut.-Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Capt. Francois S. Chaves, Director of the Meteorological Observatory, Ponta

Delgada, St. Michaels, Azores, and W. M. Shaw, Esq., Secretary, Meteorological Office, London; Rev. Josef Algué, S. J., Director, Philippine Weather Service.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is  $157^{\circ} 30'$ , or  $10^{\text{h}} 30^{\text{m}}$  west of Greenwich. The Costa Rican standard of time is that of San Jose,  $0^{\text{h}} 36^{\text{m}} 13^{\text{s}}$  slower than seventy-fifth meridian time, corresponding to  $5^{\text{h}} 36^{\text{m}}$  west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now always reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

During the temporary absence of Professor Abbe, Mr. H. H. Kimball has been designated Acting Editor of the REVIEW.

## FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

The first half of the month was marked by a succession of severe storms in the Atlantic coast districts. Storm warnings were hoisted along the coast well in advance of their approach, and all interests were fully advised regarding their dangerous character. On the morning of the 3d transatlantic shipping interests were advised that a severe storm would move northeastward off the middle Atlantic coast the night of the 3d. This storm passed well to the northward of the transatlantic steamship routes, and joined a deep depression that covered the north portion of the British Isles. By the morning of the 9th this depression showed barometric pressure 28.68 inches at Sumburgh Head, Scotland, with fresh to whole westerly gales over England, Ireland, and Scotland, after which the center moved eastward.

The severest storm of the month in the Lake region prevailed during the 13th and 14th. Warnings of the approach of this storm were issued for the upper Lake region the night of the 12th. On the 25th and 26th a severe storm prevailed on the north Pacific coast. Timely warning of the approach of this storm was issued to points on the Washington coast.

In the Lake region, the central valleys, and the Southern States the cold waves of the month were exceptionally severe.

On the 8th and 9th an area of low barometer, which was attended by heavy rain and followed by a cold wave, moved northeastward over the west and middle Gulf States. This cold wave carried the line of freezing temperature to the Alabama and Mississippi coasts on the morning of the 10th. The following forecast, which covered the conditions of the succeeding two days, was made for Alabama and Mississippi the night of the 8th (Sunday):

Rain Monday; much colder; Tuesday fair and cold. Temperature will fall to freezing or below to the coast line within the next thirty-six hours.

The Montgomery Advertiser, of December 10, 1901, remarked as follows regarding this warning:

The cold wave warning was issued fully thirty-six hours in advance of the cold changes; it was telegraphed to all the important towns of the State, from which points it was distributed by mail; it is learned that the information was posted in over 1,500 places in the State yesterday morning, which demonstrates the very thorough and rapid system the Weather Bureau now has for getting such warnings before those who are actually interested.

During the second decade of the month a cold wave of remarkable persistency and exceptional severity covered practically the entire United States. This cold wave extended

over the Plateau and Pacific coast districts during the 12th, 13th, and 14th, carrying the line of freezing temperature to extreme southern Arizona and the interior of extreme southern California by the morning of the 14th. On the 11th special cold wave and snow warnings were sent to live stock and railroad interests in the Denver forecast district, and on the 12th warnings were issued of freezing temperature in Arizona. On the morning of the 12th fruit shippers and orange growers in California were warned of the approaching cold. In all districts east of the Rocky Mountains warnings were distributed twenty-four to forty-eight hours in advance of the cold wave.

The second cold wave of the month in the Southern States prevailed from the 14th to the 16th, and was closely followed by a third, which was the severest of the month over the Southeastern States. The following have been selected from press notices of this cold wave:

Pacific Rural Press, San Francisco, December 21, 1901:

There has been some injury in the citrus fruit and winter vegetable districts, but, thanks to the early warnings of the Weather Bureau, those who know how to burn and smoke as a preventive from frost effects saved much property and gave a new demonstration of the efficacy of the protective measures which have been brought to high development in California.

The New Orleans Times-Democrat, December 17, 1901, editorial:

The Weather Bureau gave ample notice of the coming of the cold wave, and its predictions have seldom been more accurate as to the extent of the wave, the territory that would be affected by it, and the degree of cold the thermometer would record; and this warning did much to prevent any serious damage to the cane crop from the freeze by giving the planters time to prepare for it.

Chattanooga News, December 21, 1901:

The United States Weather service has kept the country correctly informed on the weather during the past week. If we mistake not, predictions have been verified in every instance. There is no department of our Government that has shown more improvement in ten years than the weather service. We pay this compliment to the army of men who keep their eyes on the thermometers.

Pittsburg Post, December 16, 1901, editorial:

Much credit is due the Pittsburg station of the United States Weather Bureau for its truthful and timely predictions in the recent sudden changes of weather in this section. Warnings far in advance of the first local intimation of a cold snap were sent to shippers of perishable goods, and thus much damage was averted that otherwise would have resulted. When the continuous rains and heavy snows set in warnings were also sent out notifying property holders of the imminent danger of a flood.

Pittsburg Gazette, December 16, 1901:

The disaster to a large fleet of coal boats on the river last night is shown to be not chargeable to the weather service, which sent early warning of the coming of the high waters.

Proof has been given Pittsburg in the past few days of the efficiency of the United States Weather Bureau, and particularly of its Pittsburg office, which brings the Government service to our very doors. Warning was given of the approach of the cold wave so long in advance of its arrival that persons whose business is largely dependent on weather conditions were enabled to take the precautions required by a change of temperature. Similarly the persons affected by a rise or fall of the waters were warned of the flood that has been a remarkable accompaniment of this visitation of winter. The increasing usefulness of the United States Weather Bureau to a variety of business interests long since vindicated its right to a place among Government institutions. It serves the farmer, the man who deals in farm products, the shipper by rail, the shipper by river, and the men who go down to the sea in ships to take their chances against wind and waves, and it serves them well. It is in the hands of careful, pains-taking men, whose efforts to make their studies of meteorology serve the transportation, agricultural, and commercial interests are so successful that this branch of the Government is shown to be a good business investment.

On the 19th the following warning was given the widest possible distribution in Florida:

Center of low moving rapidly southwestward over Gulf. Minimum to-night in central and north Florida will equal last night and outlook is for lower temperature Friday night. All precautions against damage by cold justified for next two nights.

The warning was followed on the morning of the 20th by the following:

Temperature will fall to about 20° at Jacksonville to-night, with temperature below freezing in the interior as far south as Jupiter. Emergency warnings, and notify postmasters.

The official in charge of the Weather Bureau office at Jacksonville reports as follows, regarding the cold wave of the 20th and 21st, and the efforts that were made to warn various interests in the State of its approach:

The cold wave warnings of the 19th and 20th were of great benefit to fruit and vegetable growers north of the twenty-seventh parallel of latitude.

The telegram of the 19th was particularly timely and effective in influencing those interested to prepare for the severe weather anticipated. It was repeated immediately by this office to one hundred and thirty-three stations, and the information was widely disseminated by the Seaboard Air Line Railway from this city to Tampa. The efforts of the above company were made more effective by using the cold-wave warning, which is four long blasts from the locomotive. This whistle warning enables growers 5 or 6 miles from the railroad to receive warnings promptly, and with the same degree of certainty as those who have the benefits of telegraphic communication. This system was put into operation in Florida five years ago, and the railroads of the State quickly realized the importance of the warnings to farmers along their lines. Steamers plying along the St. Johns River, from Jacksonville to Sanford and Green Cove Springs, display the cold-wave flag with great advantage to the people on the river. Telephone lines recently extended from Western Union centers were also called into use.

The morning of the 20th dawned overcast and slightly warmer, the forecast indicating a cold wave for Jacksonville and Tampa. Soon after its receipt, a message from the Central Office indicated that the temperature in this city the following morning (21st) would be 20°, and that freezing conditions would occur in the interior as far south as Jupiter. The forecast was fully verified; the temperature in this city fell to 19.5°, and a slight skim of ice formed in the interior in the vicinity of Jupiter, with light frost in the Miami region. On the morning of the 20th, 143 telegrams were sent from this office, and all mediums for distributing warnings were utilized. In consequence more than a million dollars' worth of fruit, vegetables, and other property was protected, and the saving as a direct result of the warning amounted to \$540,000.

A large number of letters have been received by the official in charge of the Weather Bureau office at Jacksonville with regard to the benefits that have been derived from the warnings above referred to.

During the second decade of the month destructive freshets occurred in the Appalachian Mountain districts. Excellent work was done by local observers of the Weather Bureau in notifying coal and river interests at the headwaters of the Ohio of the approach of the high water. The month closed with one of the most extensive floods on record in the James River Valley. Valuable service was rendered in connection with this flood by the official in charge of the Weather Bureau office at Richmond, who issued warnings throughout his district twelve to eighteen hours in advance of the flood stages.

The display of storm warnings on the lakes for the season of 1901 was discontinued as follows: on Lake Pepin, at the termination of December 4th; on Lakes Michigan, Huron, and St. Clair at the termination of December 14th; on Lakes Erie and Ontario at the termination of December 15th; on Lake Superior at the termination of December 11, 1901.

#### BOSTON FORECAST DISTRICT.

The month was stormy, with phenomenally heavy precipitation and sudden and abnormal ranges in temperature. The storm of the 14-15th was of unusual severity and caused much damage to property. The approach of this storm was duly announced in the forecasts and by the timely display of storm warnings along the coast. The Boston Post said, in its news columns: "But for the timely Weather Bureau warning much greater damage would have resulted." The Boston Globe said: "Shipping had ample warning from the Weather Bureau."—J. W. Smith, Forecast Official.